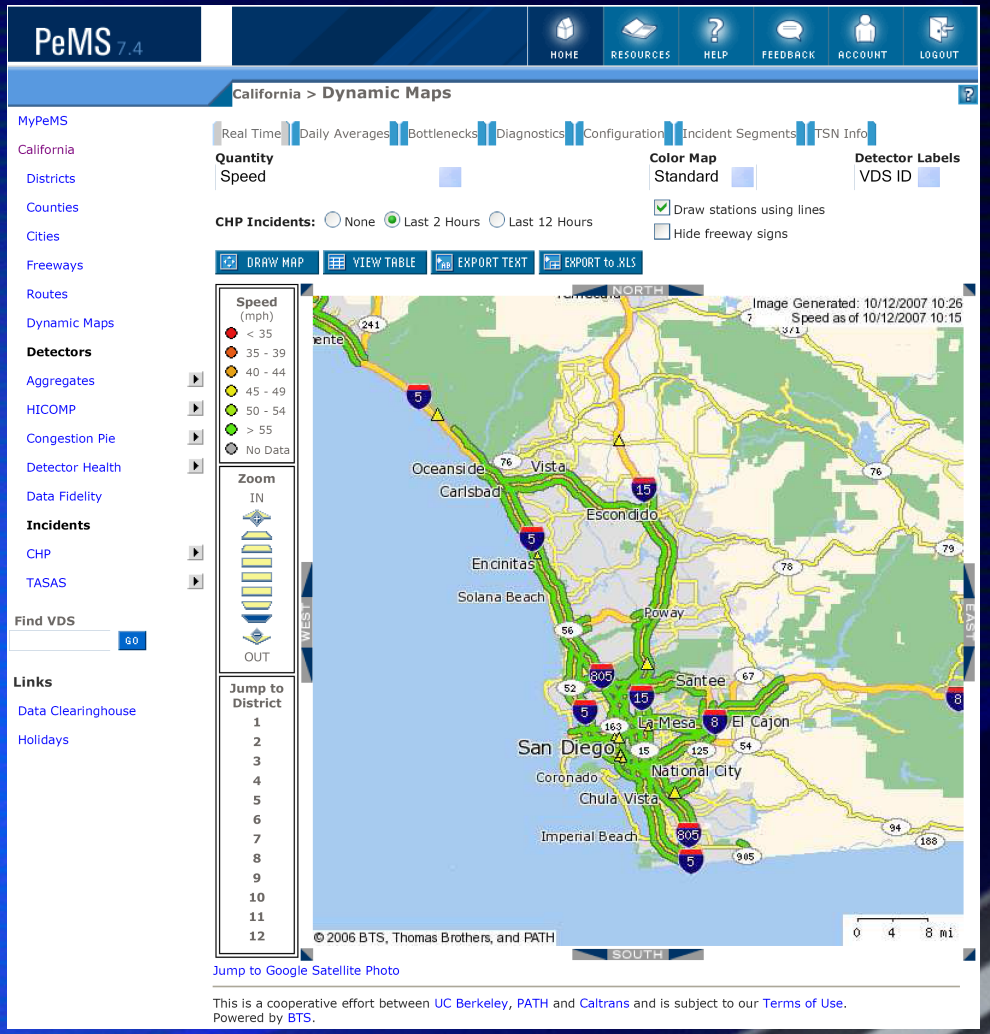
SANDAG Performance Monitoring

- Key Performance Measurement/Monitoring
  - Monitoring System Performance
  - Identify System Deficiencies
  - Track Transportation Trends
  - Determine Improvements
  - 20009 – Performance Indicator Data Management
  - 30002 – RCP, Annual Performance Monitoring Report
  - 40007 – Develop and Enhance Tools for Performance Monitoring

Performance Measures

- Baseline Indicators
  - Speeds
  - Travel Times
  - Usage (i.e., volumes, ridership)
- Statewide **Freeway** Performance Measurement System (PeMS) – Key Tool
  - Collect freeway detector data every 30 seconds, 24/7



SANDAG Vision

- Develop Multi-Modal PeMS to include real-time Transit and Arterial Data and Improve Reporting (under development)
  - *A-PeMS*
  - *T-PeMS*
- Develop Door to Door Travel Times and Compare Trip Times Across All Modes
- Examine System Integration:
  - Planning Level Performance Monitoring
  - Real-time Transportation Management (ICM)
  - Traveler Information - 511

Characteristics of Arterial Data

Quantities

– Volume, occupancy (% of time the detector is occupied), speed and “presence”

Time Intervals

– Per second, coordinated per signal cycle, uncoordinated per 30-secs/5-mins

Detector Locations

1. Advance/system/mid-block detectors
   - Hundreds of feet upstream of intersection
2. Stop-bar/stopline
   - Immediately upstream of intersection, most are incapable of counting vehicles
3. Departure
   - Immediately downstream of stop-bar or intersection

Signal Timing Information

1. Cycle length, phase sequence, green times, timing offsets between intersections
2. Event data (reasons why the phase changed)
   1. Gap out (requests from other approaches, see a gap on this approach)
   2. Max out (requests from other approaches, max green time hit)
   3. Force off (max green extension timer hit)

Transit Data Characteristics

Main data elements available:

- Schedules describing the routes, trips, stop times, fares for a transit operator
- Automatic Passenger Counts (APCs)
  - The number of people that get on and off the bus at each stop.
- GPS-based location information, Automatic Vehicle Location (AVL)
  - Can provide timepoint-to-timepoint analysis (running time)
  - Or it can provide random sampling of the locations of the buses
- Other types are less common: farebox information, odometer readings, wheelchair lifts, etc.

Performance measures:

- Static Level of Service (based on schedules)
  - Percentage of residences within a specific distance of a transit stop
  - Frequency of scheduled trips can be related to a level of service
  - Number of trips per hour/day
- Demand Analysis (based on passenger count data)
  - Demand along a route
  - Passenger crowding
  - Percentage of seats occupied (capacity utilization)
- Effectiveness (based on AVL data)
  - Percentage of trips on time (at departure, arrival and en route)
  - Schedule adherence
  - Travel time (to compare to other modes)

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Near Term Efforts - A-PeMS/T-PeMS

Arterial Performance Measures

- To properly compute travel time for an arterial we need:
  - Signal timing data
  - Count data (coordinated with signal timing data)
- Working on deploying additional detectors and extracting data at existing intersections
- Working on enhancing PeMS back end system functionality (A-PeMS then T-PeMS)

Transit Performance Measures

- Working to setup a real-time feed for data
- Working on extensions inside of PeMS to compute transit measures

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SANDAG VISION -

Enhance Performance Monitoring Efforts along arterials and Transit Provide us with the ability to:

- Determine freeway, arterial, transit travel times
- Track Transportation System Trends
- Provide Arterial and Transit real-time Transportation Information
- Measure impacts/benefits on to Transportation System